HTIRC03-002

1. A method to reduce read gap width in a CPP spin valve, having top and bottom TEC leads, comprising:

providing top and bottom magnetic shields that are located above and below said top and bottom TEC leads respectively;

inserting top and bottom supplementary magnetic shields, between about 50 and 300 Angstroms thick, between the spin valve and said top and bottom TEC leads respectively; and

inserting top and bottom magnetic decoupling layers between the spin valve and said top and bottom supplementary magnetic shields.

2. The method of claim 1 wherein the read gap width is about 430 Å less and the free layer is closer to the center by about 30 Å, relative to said spin valve when lacking said supplementary magnetic shields.

3. The method of claim 1 wherein said bottom spin valve has a total thickness, including said top and bottom magnetic shields, of between about 2 and 6 microns and a read gap width that is less than about 0.07 microns.

4. The method of claim 1 wherein said bottom magnetic decoupling layer is Cu, Ru, Rh, or NiCu.

5. The method of claim 1 wherein said bottom magnetic decoupling layer is between about 10 and 50 Angstroms thick.

6. The method of claim 1 wherein said top magnetic decoupling layer also serves as a capping layer for said spin valve.

7. A CPP spin valve, having top and bottom TEC leads and a read gap, comprising:

top and bottom magnetic shields that are located above and below said top and bottom TEC leads respectively;

top and bottom supplementary magnetic shields, between about 50 and 300 Angstroms thick, between the spin valve and said top and bottom TEC leads respectively; and

top and bottom magnetic decoupling layers between the spin valve and said top and bottom supplementary magnetic shields.

8. The spin valve of claim 7 further comprising a read gap whose width is about 430 Å less and a free layer that is more central by about 30 Å, relative to said spin valve when lacking said supplementary magnetic shields.

9. The CPP spin valve of claim 7 wherein said spin valve has a total thickness, including said top and bottom magnetic shields, of between about 2 and 6 microns and a

read gap width that is less than about 0.07 microns.

10. The CPP spin valve of claim 7 wherein said bottom magnetic decoupling layer is Cu, Ru, Rh, or NiCu.

11. The CPP spin valve of claim 7 wherein said bottom magnetic decoupling layer is between about 10 and 50 Angstroms thick.

12. The CPP spin valve of claim 7 wherein said top magnetic decoupling layer also serves as a capping layer for said spin valve.

13. A process to manufacture a CPP GMR read head, having a write gap, comprising:

depositing a bottom magnetic shield layer on a substrate;

depositing a bottom TEC lead layer on said bottom magnetic shield layer;

depositing a seed layer on said bottom TEC lead layer;

depositing on said seed layer a bottom supplementary magnetic shield layer that is between about 50 and 300 Angstroms thick;

depositing a magnetic decoupling layer on said bottom supplementary magnetic shield layer;

forming a bottom spin valve, including a capping layer, on said magnetic decoupling layer;

depositing on said capping layer a top supplementary magnetic shield layer that is between about 50 and 300 Angstroms thick;

depositing a top TEC lead layer on said top supplementary magnetic shield layer; and

depositing a top magnetic shield layer on said top TEC layer.

14. The process described in claim 13 wherein the step of forming a bottom spin valve further comprises:

depositing an antiferromagnetic layer;

depositing an AP2 layer on said antiferromagnetic layer;

depositing an antiferromagnetic decoupling layer on said AP2 layer;

depositing an AP1 layer on said antiferromagnetic coupling layer;

depositing a copper spacer layer on said AP1 layer;

depositing a free layer on said copper spacer layer;

depositing said capping layer on said free layer; and

causing said AP1 and AP2 layers to become magnetically anti-parallel to one another.

15. The process of claim 14 further comprising formation of a read gap whose width is about 430 Å less, and the free layer about 30 Å more central, relative to said spin valve lacking said supplementary magnetic shield.

16. The process described in claim 13 wherein said read gap is between about 300 and 700 Angstroms.

17. The process described in claim 13 wherein said magnetic decoupling layer is Cu, Ru, Rh, or NiCu.

18. The process described in claim 13 wherein said magnetic decoupling layer is deposited to a thickness between about 20 and 30 Angstroms.

19. The process described in claim 13 wherein said supplementary magnetic shields are NiFe, CoFe, CoNiFe, or CoNbZr.

20. The process described in claim 14 wherein the step of depositing a capping layer further comprises depositing, in succession with no intervening steps, layers of copper, ruthenium, and gold to a total thickness between about 30 and 60 Angstroms.

21. A CPP GMR read head, having a write gap, comprising:

a bottom magnetic shield layer on a substrate;

a bottom TEC lead layer on said bottom magnetic shield layer;

a seed layer on said bottom TEC lead layer;

on said seed layer a bottom supplementary magnetic shield layer that is between

about 50 and 300 Angstroms thick;

a magnetic decoupling layer on said bottom supplementary magnetic shield layer;

a bottom spin valve, including a capping layer, on said magnetic decoupling layer;

on said capping layer, a top supplementary magnetic shield layer that is between about 50 and 300 Angstroms thick;

a top TEC lead layer on said top supplementary magnetic shield layer; and

a top magnetic shield layer on said top TEC layer.

22. The read head described in claim 21 further comprising:

an antiferromagnetic layer on said seed layer;

an AP2 layer on said antiferromagnetic layer;

an antiferromagnetic decoupling layer on said AP2 layer;

an AP1 layer on said antiferromagnetic coupling layer;

a copper spacer layer on said AP1 layer;

a free layer on said copper spacer layer;

the capping layer being on said free layer; and

said AP1 and AP2 layers being magnetically anti-parallel to one another.

23. The read head of claim 22 further comprising a read gap whose width is about 430 Å less and a free layer that is more central by about 30 Å, relative to said read head when lacking said supplementary magnetic shield.

24. The read head described in claim 21 wherein said read gap is between about 300 and 700 Angstroms.

25. The read head described in claim 21 wherein said magnetic decoupling layer is Cu, Ru, Rh, or NiCu.

26. The read head described in claim 21 wherein said magnetic decoupling layer has a thickness between about 20 and 30 Angstroms.

27. The read head described in claim 21 wherein said supplementary magnetic shield is NiFe, CoFe, CoNiFe, or CoNbZr.

28. The read head described in claim 22 wherein the capping layer is a laminate of copper, ruthenium, and gold having a total thickness between about 30 and 60 Angstroms.